

**Integrated Project 026950 : SATSIX****D4000_1*****Dissemination and Use plan*****Contractual Date of Delivery to the CEC: May 2006****Actual Date of Delivery to the CEC: 18/05/2006****Author(s) : M. Mazzella****Participant(s): See list****Workpackage: WP 4000****Est. person months: 5****Security: N/A****Nature: R****Version: 1.0****Total number of pages: 26****Abstract:**

The **SATSIX Dissemination and Use Plan** deliverable describes the plan for the dissemination of knowledge gained during the work. In the framework of the envisaged dissemination activity, information relevant to the **SATSIX** project is being monitored, collected, filtered and distributed to a wider public. The material gathered and produced in the frame of this task will be made available to the public in order to maximise the benefit to the entire scientific community. Large use of the currently available technology for distribution of electronic information such as Web sites, mailing list, CD-ROM is envisaged.

This document also describes the exploitation plan of the projects results for the consortium as a whole, for individual participants or groups of participants. It presents (is expressed) the projects target groups and its strategic impact on the participants in terms of improvement of competitiveness and creation of market opportunities. The project will study, implement and validate innovative concepts and cost-effective solutions for broadband satellite systems and services. It will promote the introduction of the IPv6 protocol into satellite-based communications systems and the development of hybrid networks coupling satellite and wireless access technologies. During the project, the concept will be validate by simulation followed by emulation using a laboratory test bed. The project will also support live experimentation with end-to-end applications to promote the seamless integration of competitive access technologies with existing infrastructure.

Keyword list: *Satellite, Terminal DVB-RCS, IPv6, WLL, LAN, Corporate scenario, applications.*

Executive Summary

The SATSIX project aims at demonstrating that satellite systems can be very good drivers for the deployment of IPv6 in the Internet, and could even play a key role. They can offer a cost effective and rapid solution for ISP's to provide native IPv6 connectivity and services to geographically spread early interested users.

The purpose of the present document is to describe the plan for the dissemination of the main results achieved in the IST-SATSIX Project. Both electronic and paper dissemination means are used in the project for promotional and documentation purposes. In the framework of the envisaged dissemination activity, information relevant to the SATSIX project is being monitored, collected, filtered and distributed to a wider public. The material gathered and produced in the frame of this task will be made available to the public in order to maximise the benefit to entire scientific community. Large use of the current available technology for distribution of electronic information such as the Web, electronic mailing lists, CD-ROMs is envisaged.

After an introduction to the SATSIX project, the dissemination strategy is described (Chapter 2). The strategy has been split in two categories, external and internal dissemination. External dissemination presents the approach and the target groups. The major fields for possible contribution in the frame of the IST project clustering activity. For internal dissemination, all conventions are described.

The second section (Chapter 3) of the document is related to the dissemination tools, where the different media are evaluated and described (Web site, CD-ROM...). In this section all information related to the different standardisation groups, the actual stage of development and the way SATSIX will proceed are explained.

Due to the importance of the training activity, a dedicated section has been created (Chapter 4).

The last section (chapter 5) is related to the use and exploitation plan of each SATSIX partner.

Finally, the document concludes with chapter 6. SATSIX will thus contribute to:

- the implementation of the European Space Policy, as defined by the White Paper on Space, “a new European frontier for an expanding Union” (11 November 2003 COM(2003) 673)
- the implementation of the recent European Initiative for the Information Society, i2010 (“A European Information Society for growth and employment”), which includes the digital divide issue within the wider framework of eInclusion (European Initiative for 2008).

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1 INTRODUCTION

1.1 Scope

The scope of this document is to provide a clear overview of the efforts the **SATSIX** Consortium will dedicate for the dissemination and standardisation of its findings and therefore contribute to demonstrating that satellite systems can be very good drivers for the deployment of IPv6 in the Internet. They can offer a cost effective and rapid solution for ISP's to provide native IPv6 connectivity and services to geographically spread early interested users.

1.2 Related documents

RD1	SATSIX Annex 1 : Description of the work

1.3 Terminology and definition

Authentication	the process by which the end user proves its identity.
Authorisation	the process by which an end user, according to its identity and its profile, is allowed or not to access a particular service.
Web browser	a software for end user devices able to display interactively web pages, according to standards (such as HTTP) and common industry practices.
Wi-Fi	a wireless protocol defined by standard IEEE 802.11b/g.
Push technology	Automatically send special information and S/W to client desktop machine registered with the push channel server
Streaming technology	Offer and receive multimedia data such as audio/video in real time from the Internet or Intranet (Real player, Windows media player,)
IP Multicasting	Transmit serial data with one multicast group address to point-to-multipoint, or multipoint-to-multipoint
Audio/video encoding & decoding technology	Transmit various multimedia contents in MPEG (or others) standards

1.4 Abbreviations

QoS	Quality of Service
VoIP	Voice over IP

VPN	Virtual Private Network
WSP	Wireless Service Provider

2 OVERVIEW

2.1 Project objectives

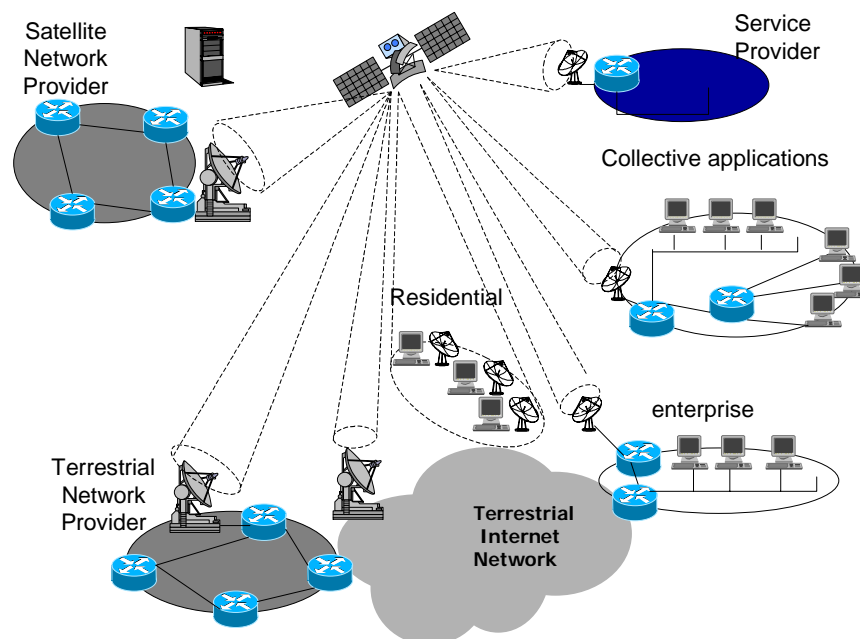
The objectives of SATSIX are :

1. to lower the cost of broadband satellite access, through the development of new satellite access techniques and the integration of wireless local loops (WiFi and WiMax),
2. to develop recommendations, test beds, trial networks showing how satellite broadband access shall integrate Next Generation Networks, based on IPv6, and support new multimedia applications.

2.2 Project description

The SATSIX project will thus focus on satellite systems that offer attractive solutions to the access segment of wider networks in several main scenarios, that allow:

1. for all types of users, to access the Internet and other widely distributed networks (e.g. Virtual Private networks - VPN's) directly or via local networks (WiFi or WiMax, LAN etc.)
2. for corporate and SME users, to set up (virtual) private networks via a backbone including satellite systems inter-working with terrestrial networks where necessary.



The satellite will facilitate extension of broadband access into rural areas and ensure access to large network. The satellite encourages the creation of “Public Access Points” in order to extend broadband access (eEurope recommendations). During the project, the concept will be validated by simulation followed by emulation using a laboratory test bed. The project will also support live experimentation with end-to-end applications to promote the seamless integration of competitive access technologies with existing infrastructure.

2.3 Expected results

SATSIX will enable Internet access via satellite for end-users. The aim is to give the customer with a wide choice of broadband services. Satellite networks based on the two-way DVB-RCS standard have been introduced for duplex communications. The latest revision of DVB-RCS standard now includes DVB-S2 on the forward link and the capability to support Dynamic Rate Adaptation (DRA) and Adaptive Coding and modulation (ACM) both on the forward and the return link. The expected results of the project are the following:

- Impact of integration of IPv6 protocol into DVB-S2 / DVB-RCS
- Definition of inter-networking aspects [Sat + WiFi, Sat + WiMax, ...]
- Definition of hybrid satellite systems [OBP + Transparent payload]
- Integration of innovative applications into satellite networks
- Definition of QoS for the different scenarios.
- Critical path validation through emulated and live test beds

2.4 Relevance to the global objectives of IST priority

SATSIX will help implement the European Space Policy and the i2010 European Initiative. i2010 is the first Commission initiative to be adopted under the EU's renewed Lisbon strategy. It focuses on the most promising sector of the EU economy: ICT (Information and Communication Technologies) accounts for 40% of Europe's productivity growth and for 25% of EU GDP growth. Through this Initiative, the Commission outlines many policy priorities to which SATSIX will contribute:

- Inclusive European Information Society: e-Government for citizen-centred services (2006), actions to overcome the geographic and social "digital divide" (eInclusion - 2008)
- Strategy for a secure information society (2006)
- Comprehensive approach for effective and interoperable Digital Rights Management (DRM) (2006-07)
- Trans-european demonstrator projects
- Integrating SME better in the EU research projects

SATSIX will take advantage of reuse of existing or planned satellites (with or without On-Board Processing) in Ku and/or Ka band. This will enable the development of an open competitive solution based on low-cost end-user and access network equipment. As such, it will foster the exploitation of technical capabilities of the space community with the objective of seizing market opportunities and meeting the demands of optimised access technologies in line with i2010 objectives. SATSIX will allow to create several application perspectives through the optimisation of the combination of space-based systems and terrestrial infrastructure (Satellite + WiFi, Satellite + WiMax).

These activities will contribute to reinforcing and maintaining Europe's leadership in Broadband Multimedia Satellites and also in NGN and IPv6 network architecture deployment. SATSIX consortium has been created with the aim of strengthening the supply chain for these technologies within the European Research Area through the integration of horizontal and vertical key expertise.

2.5 Relevance to the work programme research areas

SATSIX project addresses the following research area of 2005-06 work programme: **Information Society Technologies**.

SATSIX contributes to enhance the positioning of satellite access systems in the Broadband Access Market and capitalises on the development and deployment of NGN and IPv6 through satellite. Through an emulated test bed and live demonstrators, SATSIX will prove the capability of the satellite to provide affordable services to a large customer range.

2.6 Approach to Dissemination and use

The management of dissemination activities has been defined in [RD1] as a part of the dissemination work package WP 4000. The SATSIX Team considers the exploitation of the projects results as very important for the following reasons:

- The SATSIX Project aims at contributing tangibility to technologies (Multimedia Broadband Satellites) that are currently state of the art and will be made available to the commercial market place during the next five years.
- The project and its results will have benefits for extending the boundaries of communications access, particularly in rural and less-developed areas of the Community. Also it is aimed at developing the traditional satellite market by improving service delivery efficiency and making it more competitive with terrestrial means. This should be communicated to a wide audience throughout the Community.
- The project will play a crucial role in convincing investors, regulatory bodies and potential partners that Multimedia Broadband Satellites are the adequate system to provide added value multimedia services all over Europe to mobile users.

2.6.1 Dissemination strategy

In order to accomplish this, we propose to follow a dissemination coherent and well structured dissemination strategy. This strategy is exposed in the rest of the document in a logical manner, structured in rings:

- At the consortium level, including web sites, workshops...
- At the IST level, including clustering activities, participation to NGN initiative, IST conferences...
- At the international community, including scientific and economic events, standardisation (IETF, ETSI, DVB Forum...)

The information disseminated at these different levels will be made available in two different formats: Electronic formats (i.e. WWW Site and CD-ROM) and Paper formats (i.e. papers published, press releases, leaflet, poster...). Independent of the different dissemination format used, the project will attempt to keep the theme and style unified by following common basic rules in order to clearly convey concepts that users will be able to relate to.

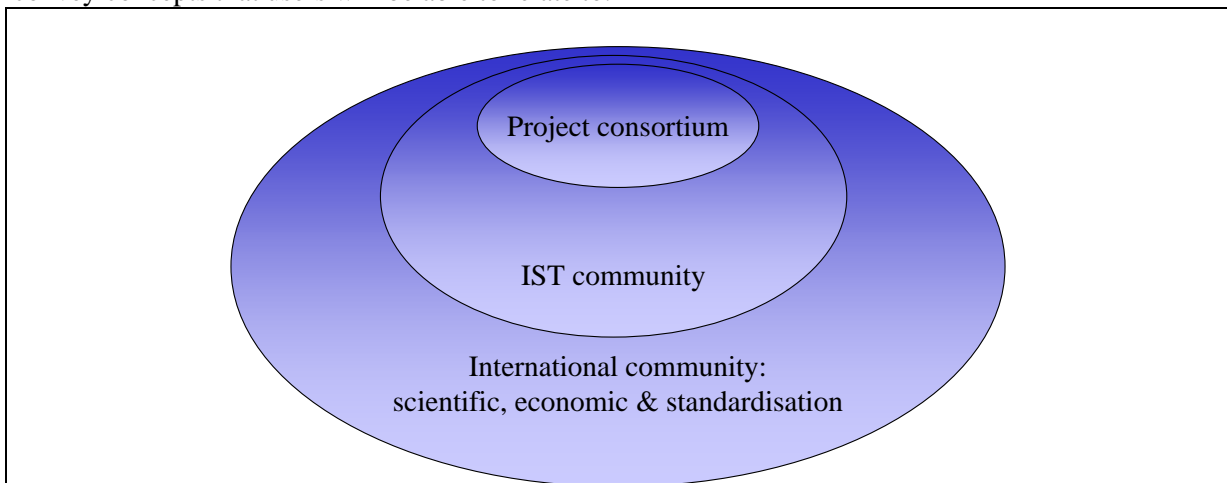


Fig 1 : Dissemination strategy

2.6.2 Dissemination organisation

2.6.2.1 At project level

A mailing list have been set up in order to perform textual information exchanges between partners of the consortium:

- technical (satsix@laas.fr) distributes information to technically oriented participants
- Web Site [www.ist-satsix.org] to be used for storage and distribution of information

These are essentially private mailing lists restricted to the use of the consortium.

2.6.2.2 At IST level

This level consists in the clustering activity within “Broadband for All” of the Information Society Technologies (IST) program. More precisely, SATSIX Project focus is on Action Line IST-2004-2.4.4, Call 4 “Broadband for All”.

In the frame of the EU technical activities, the SATSIX Project will try to establish suitable links with the other IST Projects (e.g. EuQoS,...) dealing also with satellite communication issues (e.g. SATLIFE,.....,etc....). The natural environment to foster such links will be the clustering activity. Cross-fertilisation among IST projects will be encouraged and links among the web pages of the related projects will be adopted. In addition, when applicable and advisable, the possibility for specific co-operations with other Projects will be investigated.

Other important dissemination forums in the EU are certainly the Networks of Excellence (SATNEX,...) that provide useful opportunities for interaction and discussion among academic, university, research centres and manufacturers.

3 DISSEMINATION PLAN

Appropriate dissemination of SatSix results is key to enable the project to become a real industrial and business opportunity for Europe. Communication and promotion will clearly be needed to efficiently reposition satellite systems as a credible and permanent component of the European broadband infrastructure. The dissemination plan will therefore focus on:

- Standardisation bodies
- Potential final users (public at large)
- Research and academic communities

3.1 Dissemination policy

SATSIX will organise one workshop in 2007 with different types of interest groups, to better understand the business requirements of the players in the current value networks, to validate the new business models etc.... It will also give presentations in scientific conferences, like e.g. the annual IST Conference, the International Communication Conference, International Broadcast Conference, ASMS TF conference as the results become available.

- **Course material:** The course material on the Project results will be gathered and used by the university partners for giving university courses on the future broadband satellite systems and the convergence of broadcast/broadband systems. The same material can also be used in the workshops with companies to get feedback on the achieved results.
- **Printed and presentation materials:** SATSIX will produce a Project leaflet available to all interested parties. It will include information e.g. on the research targets, schedules and the composition of the Consortium. A PowerPoint slide set will be prepared, and made available on the Web site, illustrating the research work and latest achievements.
- **Liaisons with related projects:** SATSIX has naturally very close links with other projects and NoE's in which project members take parts. It may also set-up liaisons during concertation meetings for the exchange of the non-confidential information with other projects focusing on IP protocol and broadband satellite.

3.2 Results to be disseminate

Successful dissemination and exploitation of the results of the IP project are not only in the interest of the project partners, but also provide economic, technological and social benefits to industry and society as whole. The consortium recognises exploitation as an integral part of the research project life cycle, ensuring that both tangible and intangible results finally benefit industry and society.

The SatSix consortium consists of a set of complementarily partners from different European countries. This diversity will promote the transfer of skills and expertise among the partners and, consequently, between the participating countries.

The project results will receive widespread dissemination to industrial companies through:

- advertising in technical specialised press and trade magazines,
- describing the intended equipment on each participant's web site.

The project results will also be disseminated by partners active in R&D through:

- participation and contribution to standardisation bodies, including DVB-RCS, SATLABS, ETSI BSM and IETF
- publishing articles in scientific journals (including possible special issues)
- conference publications on the project results and scientific seminars (special sessions)

This diffusion of the results will be made in respect of the business interest of the industrial partners. Any proposed publication or communication by one of the parties, regardless of the media, in connection with all or part of the project is required to be submitted for the prior written consent of the Steering Committee. A list of the main results to be disseminated is given below.

Information to be disseminated	WP	Priority audience
IPv6 over satellite for broadband usage	several	• ETSI BSM, SatLabs
Broadband satellite network requirements	1000	• ETSI BSM, SatLabs
Satellite access architecture	2000	• ETSI BSM, SatLabs • Satellite and network operators
Network architecture and satellite payload architecture	2000	• ETSI BSM, SatLabs • Satellite and network operators
Simulations results	2000	• ETSI BSM , SatLabs
Demonstration results and evaluation	3000	• ETSI BSM, SatLabs • Satellite and network operators • Services providers
Live trials measurements and evaluation	3000	• Satellite and network operators • Services providers

Table 1: Results to be disseminated

3.3 Dissemination channels

The table below shows the various dissemination channels that SATSIX will use.

Type	Audience	Foreseen dissemination channels
<i>Publications</i>	<ul style="list-style-type: none"> Scientific community Satellite providers 	<ul style="list-style-type: none"> IEEE communication magazines and journals Satellite communications journals (e.g. Satellite communications)
<i>Conferences</i>	<ul style="list-style-type: none"> Scientific community 	<ul style="list-style-type: none"> IEEE conferences IBC 2006: Amsterdam 23rd AIAA International Communications Satellite Systems Conference Ka band utilization conference
<i>Standardisation</i>	<ul style="list-style-type: none"> ETSI IETF SatLabs 	<ul style="list-style-type: none"> Contribution to BSM working group Contribution to SatLabs or DVB-RCS group activities Contribution to working groups (msec, rohc, ipdvb,...)
<i>Web site</i>	<ul style="list-style-type: none"> General 	<ul style="list-style-type: none"> SATSIX Web Site Partners Web Site
<i>Workshop</i>	<ul style="list-style-type: none"> Scientific community 	<ul style="list-style-type: none"> IST Summit Broadband for All Conference & exhibition ASMS-TF Workshop ESA “IP over satellite” workshops
<i>Training sessions</i>	<ul style="list-style-type: none"> Partners 	<ul style="list-style-type: none"> Internal training sessions
<i>Project</i>	<ul style="list-style-type: none"> General 	<ul style="list-style-type: none"> Project Workshop

Table 2: Dissemination channels

3.4 WEB Presence

The Web site is located at URL: <http://www.ist-satsix.org>. This Web site will set and maintained by CNRS/LAAS. If needed, a copy of the site will be reachable in CNRS/LAAS Web site, in order to ensure the Web presence of the project.

A first release of the site will consist of the official project summary and will be reachable at the temporary URL <http://www.laas.fr/ist-satsix/>.

At a second step, the Web site will be reachable at the official URL given above.

Public Web site functions are described hereafter. The Web site contains the following items:

- Project Overview: objectives & innovations
- Presentation of the consortium
- Work description: work packages, work plan, public deliverables
- Publications

The Web site will also present a private area, in an intranet section with an access restricted to Satsix partners and European Commission.

The Web site will also give projects news and announcements in the public area; the projects publication list will be updated as soon as a new project publication comes out.

3.5 Standardisation

The SATSIX project will constantly monitor current and emerging standards activities to ensure that its work is taken into account in, and consistent with, the latest standards. The standards or recommendations concerned notably include those generated by ETSI, IETF, DVB and SatLabs. The current standard works of most relevance to SATSIX are described in the following sections.

3.5.1 ETSI BSM

Current work aims to produce specifications that extend the scope of Broadband Satellite Multimedia (BSM) standards. The BSM architecture and related concepts are designed as the basis of an open platform based on IP service delivery. However, more work is urgently needed to develop further and extend the standards for IP inter-working functions and related network services that have already been identified, both within ETSI and in other standards bodies.

Satellite networking standards are needed to promote the convergence of satellite access network services with the established and emerging terrestrial access services by providing a comprehensive framework for standards-based inter-working between satellite networks and terrestrial IP networks (both Intranets and Internet). The ETSI BSM 2005-6 work program is based on IP, and extends from the transmission layer through to the application layer. It also extends the work into five new areas:

- Quality of Service (QoS)
- Addressing and routing
- Network security
- Transition to IPv6
- Multicast

Standardisation in these areas is being supported at ETSI by a new Specialist Task Force (STF-283), in which STK and UNIS have been selected to participate as experts (STK as QoS area leader, UniS as security area leader).

SATSIX is also represented in ETSI BSM by several partners. It is therefore expected that the project will significantly contribute to the following topics:

- SI-SAP (Satellite Independent – Service Access Point) definition
- SI-SAP over DVB-RCS
- QoS architecture
- Security architecture
- IPv6
- Multicast
- Routing and addressing.

Further details can be found at http://portal.etsi.org/Portal_Common/home.asp.

3.5.2 IETF

Currently the ipdvb (IP over DVB) Working Group (WG) is active in satellite-specific areas concerning several aspects of IP over DVB transport. Within this WG the project, through specific expert partners, will contribute to layer 2 encapsulation, ARP and security.

In addition, other WG's of special relevance to satellite issues will be supported by the project, notably msec WG (Multicast Security) , concerning multicast security.

The project will generate Internet Drafts for the above WG's and contribute to the WG's work.

The project will also consider contributing to the rohc WG (Robust Header Compression).

3.5.3 DVB-RCS/SatLabs

Compliance to DVB-RCS is more and more a differentiating factor on the market. Previously, customers were simply requesting a DVB-RCS solution but now customers request a DVB-RCS certificate to prove compliance. The DVB-RCS community (operators, manufacturers, space agencies), grouped in the SatLabs organisation (now an European Economic Interest Grouping - EEIG), is committed to ensuring interoperability among DVB-RCS terminals and systems and the availability of solutions for interoperability testing and certification. SatLabs has therefore developed a test bed and selected a laboratory that will conduct Terminal certification testing (operational by April 2005).

SatLabs, initiated by the European Space Agency, has the support of a wide representation of industry. It should be noted that SatLabs aims to define a subset, or set(s) of common options of DVB-RCS and of implementation aspects that should simplify the production and reduce the cost of equipment. SatLabs is also a major contributor to DVB-RCS standard evolutions. However SatLabs has no

funding to develop or demonstrate solutions, and these aspects are left to industry. This offers an opportunity for SATSIX to make an important contribution in terms of validation and demonstration of the SatLabs recommendations.

The SATSIX project will contribute to SatLabs informally through common partners in establishing consensus, and also directly using project results when appropriate and depending on the agenda of SatLabs. It is expected that the project will contribute through participating partners to the following topics which are being actively discussed:

- Security
- QoS & Radio Resource Management.
- Connection Control Protocol

but also to future topics that SatLabs may have to address such as:

- IPv6 support
- WLL – satellite link inter-working
- Optimised encapsulation and header compression support.

3.6 Trials and Demonstrations

The trials and demonstrations will be carried out over four real satellite systems.

3.6.1 Scenario 1 : Corporate applications on DVB-RCS transparent access platform

This scenario will allow to assess and validate the IPv6 application scenarios defined in the project over a DVB-RCS star network and operational architecture. It includes the required adaptation for coupling the hub and the applications which will have to be studied and then implemented.

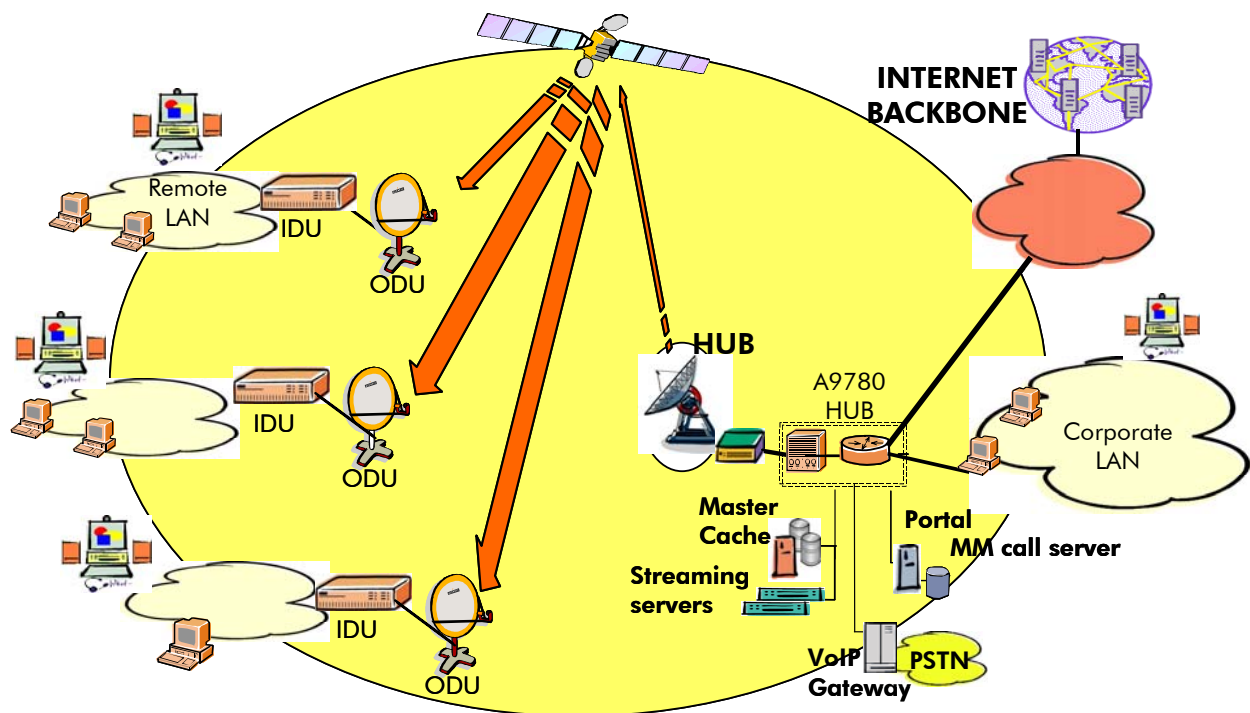


Figure 1: Corporate applications on DVB-RCS transparent access platform

The demonstration will valid the following features :

- the Multicast support,
- the security implementation,
- the mobility enhancement provided to Corporate tele-workers,
- the QoS perceived and really brought to end-users regarding the applications which are real-time critical like:
- the Collaborative Working
- the Videoconferencing
- live or real-time encoding video and streaming.

For doing that, AAS-F will adapt its current platform to host SATSIX key features and hence to be able to assess in that context the Corporate Applications. Also, innovative collaborative working applications, developed by LAAS, will be evaluated on the same platform. This will allow a benchmarking between commercial applications (AAS-F ones) and applications developed internally from open source modules (LAAS ones).

3.6.2 Scenario 2: Collective Access Terminal on DVB-RCS transparent access platform

This scenario will be developed and evaluated the Collective Access Terminal part. WLL is able to share satellite connection and its costs among the users. Therefore this combination of access technologies can reduce the costs of a user and can make satellite connection more affordable.

This live trial is able to show the real user's behaviour and can help to evaluate not only the measured parameters but also the feeling of the users. This trial will connect educational, governmental, home and small office users to the Internet and will evaluate the regarding applications like:

- eGovernment,
- Internet Banking,
- e-mail,
- WEB,
- Audio, video streaming,
- IP phone applications.

In this scenario, the access network is made of a connection of WLL to the satellite network. This WLL can be either WiFi or WiMax. The WLL architecture implies that the bandwidth is shared among all the terminal users of the local network, mainly depending of their distance from the access point. In order to provide an equitable bandwidth to each user, it is important to differentiate the different types of traffic, and give levels of priority among the WLL, separately to the satellite network.

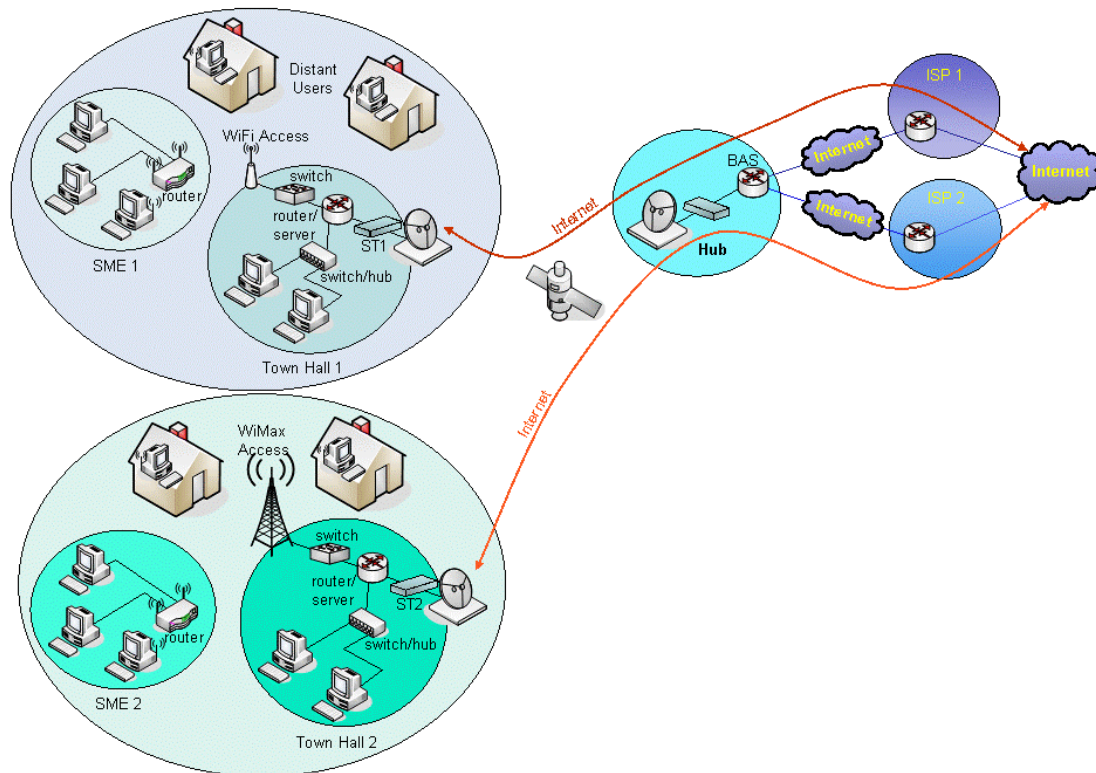


Figure 2: Collective Access Terminal on DVB-RCS transparent access platform

3.6.3 Scenario 3: Corporate applications on DVB-RCS regenerative access platform

Scenario 3 will be developed and evaluated on HSA's pilot AMERHIS system. In the frame of SATSIX, the SATLIFE platform will also be used. It will allow to assess and validate the IPv6 application scenarii defined in the project over a DVB-RCS mesh network and operational architecture. It includes the required adaptation for coupling the platform and the applications which will have to be studied and then implemented.

AMERHIS is the first in-orbit regenerative multimedia satellite system in the world based on the standards DVB-RCS/DVB-S. This project under the ESA ARTES-3 Programme currently running and almost in operation in the Hispasat's AMAZONAS satellite. SATLIFE IST project is currently bringing many enhancements to the AMERHIS system. Many of these will be used by the SATSIX project:

- Enhanced QoS and Multicast functionality
- NAT and security enhancement in ST
- New service applications as multi-conference, E-Learning, VoD, Digital TV
- Multiple SP support in NCC

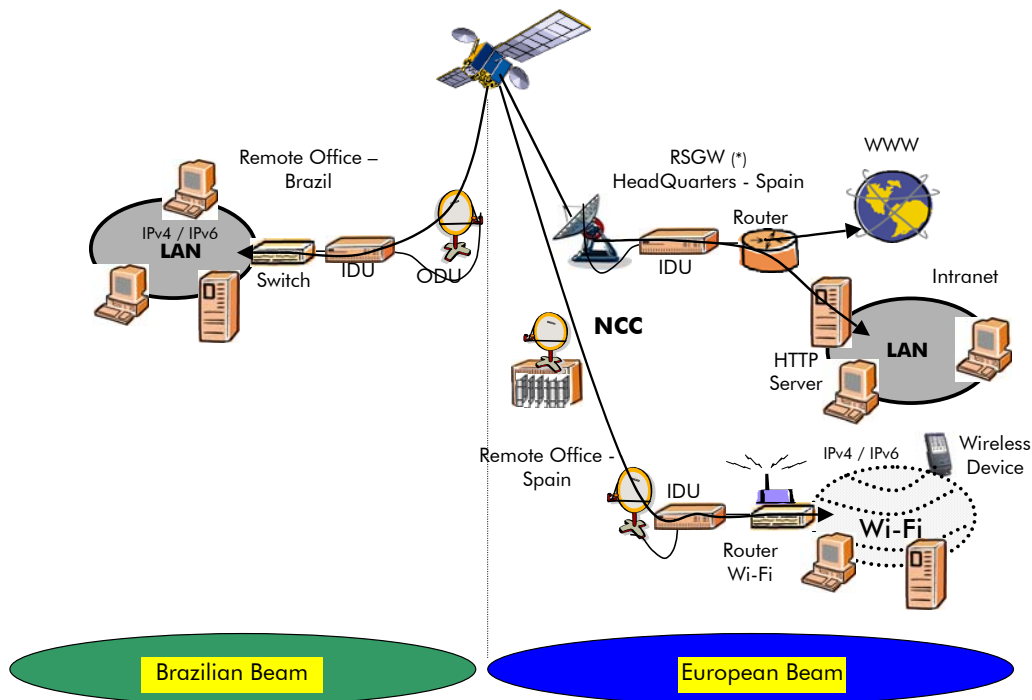


Figure 3: Corporate applications on DVB-RCS regenerative access platform

The applications that are interesting for this scenario are the following:

- VPN connectivity (it may use IPv6 tunnelling into IPv4)
- Internet and Intranet Access from Remote Offices to the Headquarters' (HTTP, FTP)
- Video Conference between different locations and beams.

These applications will be run on top of PCs connected to the LAN through an Ethernet cable or using a WiFi router and a Wireless device.

3.6.4 Scenario 4: Residential applications on DVB-RCS transparent access platform

Nowadays the principal residential application of satellite networks is the provision of Digital TV services which includes audio, video and data broadcasting to final users by satellite in one-way communication: HDTV, SDTV and IP services. Scenario 4 will be developed and evaluated on HSA's pilot DVB-RCS system. On the following figure, this residential scenario is described:

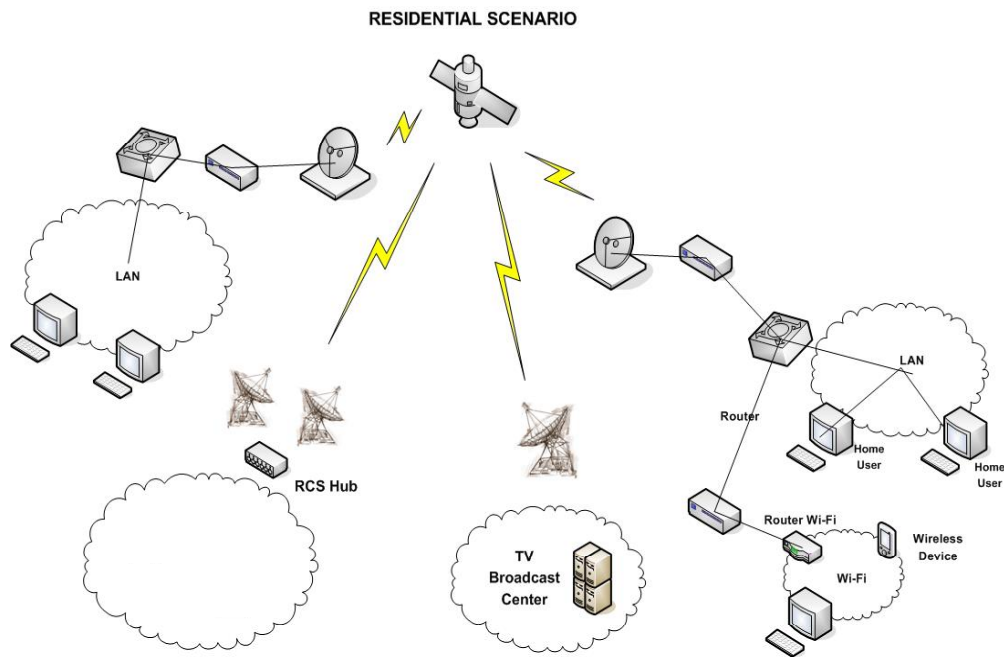


Figure 4: Residential applications on DVB-RCS transparent access platform

The applications that are interesting for this scenario are the following:

- Digital TV
- Interactive TV

These applications will be run on top of PC's connected to the LAN through an Ethernet cable or using a WiFi router and Wireless devices.

4 TRAINING

The SATSIX project will introduce a major paradigm shift in the way satellite and terrestrial IP networks. It is then necessary to grow the awareness and the competence of the industrial and scientific communities about the new role of the satellite component and its technical and economic viability. To this end, SATSIX will enforce an advanced training programme, geared towards the professional development of the people involved. The training programme will include

- the definition of a training strategy;
- the production of high level technical, professional, scientific and educational material;
- the organisation of short courses and tutorials on specific topics (e.g., BSM services, BSM technology, multicast protocols, physical layer issues, etc.);
- the organisation of stages and exchanges for researchers and members of technical staff;
- the evaluation and possible use of e-learning tools.

The activity will be lead by UniS with the support of LAAS, UoR, UoA and UVA.

4.1 Training : University of Aberdeen

UoA has a strong traditional in providing training related to the use of satellite systems and Internet engineering. Within SatSix, UoA will work with other partners to develop and deliver a workshop providing training tailored to the use of IPv6 over satellite systems and addressing the specific issues of triple-play applications.

Key contributions are:

- SATSIX results will play a role in stimulating the programme for postgraduate research at UoA - both in informing current research and in planning future topics of research;

- UoA plans to contribute two Journal papers, respectively focussed on the impact of satellite systems on congestion control algorithms and the interactions between the DCCP protocol and a satellite network. Further conference and journal papers will be submitted as appropriate.
- Participation in SatSix will provide inputs to the portfolio of training held by the UoA, improving its research position within the academic community.
- Contribute to a workshop providing training tailored to the use of IPv6 over satellite systems and addressing the specific issues of triple-play applications.

4.2 Training : University of Rome

UoR exploitation plan of project results will result in the updating of university courses, in the organization of thematic seminars and in the computation of MSc and PhD theses.

In detail, UoR plans are to exploit SATSIX results in three different ways:

- at academic level, SATSIX results will be used to improve university undergraduate and postgraduate courses and seminars;
- at research level, SATSIX results will be the basis of MSc and PhD researches and will complement the researches in related topics – in particular on-going projects and researches on UMTS and wireless resource management;
- at technology transfer level, SATSIX results will help in setting up partnerships with the industry.

4.3 Training : University of Surrey

UoS exploitation plan of project work will result in the updating of university courses, in the organization of thematic seminars and in the input to MSc and PhD theses. In detail, UoS plans are to exploit SATSIX results in three different ways:

- at academic level, SATSIX results will be used to improve university undergraduate and postgraduate courses and seminars;
- at research level, SATSIX results will be the basis of MSc and PhD researches and will complement the researches in related topics – in particular on-going projects and researches on network security, satellite communication and future mobile networks architectures. UoS plans to contribute two Journal papers, focussed on satellite network security and IPv6 multicast issues over satellites. Further conference and journal papers will be submitted as appropriate;
- at technology transfer level, SATSIX results will help in setting up partnerships with the industry.

UoS has a strong tradition in providing training related to the use of satellite systems, future networks security and architecture. Within SatSix, UoS will lead the development and delivery a workshop providing training tailored to the use of IPv6 over satellite systems and addressing the specific issues of triple-play applications. UoS will co-ordinate the liaison with the SATNEX NoE platform for SATSIX training purpose.

4.4 Training : University of Valladolid

As educational institution UVa has infrastructure and a wide experience in training activities that will be used in development of the training program. Results and knowledge acquired in Satsix can be used in learning activities for preparing better engineers, organization of seminars, update university syllabus and address PhD theses.

The results of the project will be used to:

- plan to contribute in several journals with papers relative to QoS architecture in Satellite environment.
- use the results to improve its educational background.
- to establish the basis for the relationship among partners from both fields: educational and industry.

4.5 Training : CNRS/LAAS

CNRS/LAAS plan of project results will allow us to update university courses, to propose thematic workshop and seminars. Satsix will also help us to propose MSc internships and PhD theses in related fields.

To do so, CNRS/LAAS plans are to exploit Satsix results in the following ways:

- at academic level, Satsix results will be used to improve university undergraduate and postgraduate courses;
- at research level, SATSIX results will be the basis of related MSc and PhD researches; it will also complement our researches in satellite network communication field and related topics – in particular on-going projects and researches on providing QoS using several heterogeneous network technologies to reach the end.

5 DESCRIPTION OF USE PLAN

5.1 Alcatel Alenia Space _ France

AAS-F is particularly interested in the success of SATSIX insofar AAS wants to prepare new DVB-S2/RCS generation (With associated satellite systems). The final objective being to convince Terrestrial and Satellite Operators of the interest of such added-value multimedia services based on IPv6 protocols and then help the market take-off.

SATSIX shall help AAS-F on the major following items :

- Extending the field of applications for broadband satellite through the introduction of new services and networking functionality
- Extending knowledge in IP over satellite, especially over DVB-S2 and DVB-RCS
- New satellite IPv6 applications
- Enhance its market penetration through the development of cheaper and better performing satellite access equipment as well as collective access terminals

5.2 CNRS/LAAS (LAAS), France

LAAS/CNRS main fields of interest are computing networks and multimedia distributed systems. Results of Satsix will be used in our future development related to multimedia applications and platforms using IPv6. Only protocols layering on IPv6 nets will be able to achieve QoS requirements for new applications and to support mobility.

Past experiments have pointed out the actual networks limits in terms of Quality of Service and mobility management. In this context, the design methodology and the building block approach developed in EU funded IST SATIP6 project will be used as elementary components for Satsix experiments.

On the other hand, expertise gained by our research group has created new perspectives for mobile multimedia applications, and network resources use such satellite links. At the present time, for example, most of the existent distributed applications are using IPv4 protocol and may not be

implemented on NGN networks due to heavy effort consumption if the new network is only providing IPv6. Our work related to IPv4/IPv6 translation system and multimedia distributed application supporting mechanisms and protocols relying on different networks providing various kind of QoS will be helpful and its interest will be proved in Satsix.

5.3 University of Rome (UoR), Italy

Resource management in satellite system is one of the key research field of UoR. The participation in SATSIX helps UoR in keeping the research focused on practical issues, minimizing the risk of producing useless theoretical results.

In particular, within SATSIX, UoR will benefit from the cooperation with manufacturer and operators allows UoR to verify new ideas and theoretical studies under market-oriented scenarios; moreover, resource management algorithms and protocols will be undoubtedly improved thanks to the cooperation with universities and research centres whose expertises are complementary with respect to UoR ones.

Main expected SATSIX results are the following:

- Improve the performance of resource management procedures in order to increase the Quality of Service perceived by satellite users (for example, by diminishing the delay introduced by the access protocol we can obtain better QoS for delay-sensitive applications)
- Improve the operator revenues by maximizing the network utilization via advanced resource management procedures and by explicitly considering the QoS contracts in the admission control rules.
- Tailor the resource management procedures to DVB-S2 and actively contribute to the standard development.

5.4 SINTEF (STI), Norway

SINTEF has for many years provided research-based expertise, services and products within communication and software technology. The demand for increased accessibility has put a strong focus on mobility issues as well as ambient technologies. Within SatSix project SINTEF will contribute to: the enhancement of transport protocols and the use of proxies and the interaction with bandwidth on demand protocols, the integration of satellite + WiFi and satellite + WiMax, the development of mobility architecture and protocols adapted for satellite and IPv6, and the analysis of new methods for cross-layer design to get overall optimal performance. The results of the work will increase SINTEF's competence in wireless and satellite IPv6 networking. It will be used in further R&D work, in collaboration with the University (NTNU) and in support to Norwegian industry and the Government. The outcome of the project will be published in national and international papers.

5.5 University of Surrey (UNIS), United Kingdom

In the past 15 years, UniS has actively undertaken research on satellite communications, and has involvement in a number of EU and ESA satellite communications projects. Within Satsix project, UniS will contribute to the network architecture design of the new IPv6 based satellite systems, the advanced algorithms development and analysis, especially on QoS, security and multicast aspects.. The knowledge, methodologies, and know-how obtained in this research can be developed further for the benefit of future R&D endeavours in satellite communication systems. With UniS having links with a number of international satellite and mobile communication companies, the research outcomes and simulator can be used to provide consultation and technical support as well as training. The research outcome can be disseminated via publications at international journals and conferences. Also being an academic institution, this knowledge can be fed into teaching materials as part of the University curricula, as well as topic setting for PhD and MSc student projects. Furthermore, the

technical knowledge acquired can be exchanged with other research institutions besides being fed into relevant standardization bodies, such as ETSI BSM.

5.6 University of Aberdeen (UoA), United Kingdom

Participation in SATSIX provides the commercial and industrial experience that need to underpin the key activities at UoA of training new researchers, the development of new protocol techniques and active engagement in standardisation. Relating the work at UoA to actual experimental trails under market-oriented scenarios will ensure appropriate design goals are achieved and assists in the deployment of the methods - an important prerequisite to successful standards work.

UoA's contribution will complement industrial and SME partners within the project. Its work will focus on protocol design and analysis, recognising that Internet protocols are now an important part of the complete satellite system. The work on the University of Aberdeen in SatSix will address a number of protocols - ranging from satellite-specific techniques (e.g. work on IP transmission over DVB satellite bearers), architectural issues (e.g. contributions to the ETSI/BSM WG) and transport-layer interworking issues (impacting the system design and contributing to activities that will input to the IETF).

The outputs of this work will be disseminated in the technical literature, and the contribution to standards organisations (as review comments, draft submissions, and presentations - as appropriate). In this role UoA will directly participate with the IP/S.2 study group of DVB, the architectural work in ETSI/BSM and the work of the IETF ipdvb and dccp working groups.

The key expected SATSIX results are:

- Analyse and optimise the performance of IP streaming media delivery protocols to increase the performance of users of the satellite system, while maintaining interoperability with the general Internet (considering the delay introduced by the access protocol, lightweight QoS mechanisms and the tuning of congestion-control algorithms)
- Improve the operator revenues by maximizing the link utilization through the specification of advanced encapsulation and compression techniques, and actively contribute to the standard development.
- Performance data that will assist in optimising the resource management procedures to DVB-S2.

5.7 Telefonica I+D (TID), Spain

Multimedia IP communications (specially in real-time) in satellite systems is one of the research field of TID. TID provides long expertise on networks and service aspects for IP broadband systems in general and next generation regenerative satellites in particular, with a special focus on real time communications. This includes activities related to QoS, DVB-S/DVB-RCS & satellite technologies, multicast and broadcast network communications, dynamic resource allocation, multimedia signalling, voice and video, service platforms, integration with terrestrial networks, etc. like:

- Multimedia Signaling, Multimedia SP communications platforms including Voice over IP platform for the deployment of voice and video communication services over the DVB-RCS satellite.
- Activities related to network aspects such as IPv6, QoS, multimedia signaling, integration with terrestrial networks, dynamic resource allocation, CPE automatic provisioning, protocols enhancement, management tools, security, etc.
- QoS Analysis at System Level of the different Quality of Services approaches, including IP QoS (i.e.: RSVP, Diffserv), optimization of dynamic resource allocation,

multimedia signaling QoS protocols adaptations (SIP, H.323,...), prioritization of multimedia flows, satellite specific adaptations, etc.

- Enhance the current DVB-RCS state-of-the-art, specially the issues related to the “Applications layer QoS in DVB DVB-RCS systems”, including network aspects such as QoS issues, protocols enhancement, security, IPv6, management tools, etc.
- Interworking with terrestrial networks: like PSTN, for the seamless provision of multimedia services, addressing terrestrial networks and services integration.. One example could be the rural ADSL service over satellite, providing ADSL connectivity in broadband isolated areas with a Digital Subscriber Line Access Multiplexer (DSLAM) integrated with a satellite DVB-RCS terminal to provide broadband access.

In the past years, TID has actively undertaken research on satellite communications, and has involvement in several satellite communications projects and, with it, TID has developed an expertise in research into satellite-orientated telecommunications.

The results of the project will be used:

- To extend the field of applications for broadband satellite through the introduction of new services and networking functionality
- To extend knowledge in IP over satellite
- To develop new satellite IPv6 applications
- To demonstrate the feasibility of innovative application and services over satellite.
- To develop the applications for broadband two-way multimedia telecommunications
- To support the distribution of Real Time Services over IP via satellite networks
- To support Multicast via satellite networks

TID itself will benefit from the technical know-how earned during this project execution, enhancing its own portfolio of innovative products and services for end customers, specifically on the line of real time communication services

5.8 Alcatel Alenia Space España (AASE), Spain

AAS-E has become a design reference centre for on board digital processing applications in several fields:

- Regenerative Telecom Digital Payloads thanks to On Board Processing (OBP)
- Data Handling Applications
- Numerous PFGA and ASIC designed to be used on Remote Terminal Units, Payload Interface Units, Antenna Pointing Electronics, various TM/TC interfaces equipment etc
- TT&C Transponders and Data Transmission Modulators/Transmitters

AAS-E applicable experience is found not only at design level, also on satellite system level. As main representative, AAS-E has been the project coordinator for AmerHis system, a Broadcasting Satellite Multi-Media network based on one unique regenerative and full cross DVB-RCS / DVB-S multi-spot connectivity satellite system.

AAS-E main benefits from SATSIX will derive from the impact analysis of the next generation of broadband multimedia systems. AAS-E contribution to SATSIX project will take as reference the major technological steps of this next generation:

- the development of hybrid, transparent and regenerative, payloads
 - adaptive physical layers including adaptive coding and modulation, dynamic rate adaptation
- SATSIX will also take the benefits from other past and on-going ESA initiatives (ACM, development of DVB-S2/RCS systems) that aimed at developing next generation broadband satellite systems.

AAS-E expected contributions to SATSIX are focused on the following major pillars:

- Hybrid systems: not only based on previous mentioned concept of combining transparent and regenerative platforms, but also moving a step forward in the inter-working of communication satellite systems into terrestrial networks as WiFi/WiMAX in order to provide a competitive a integrated “Quadruple Play” service to the final user.
- next generation OBP, Adaptive Switching Processor, that will allow transparent/regenerative & multi-beam circuit/packet/burst switching, optimising the uplink resources according to certain QoS priorities
- DVB-S2 broadcasting new and enhanced services for Digital TV, Video On Demand, E-learning, Video Broadcasting, Multi-conference
- better performance and cost optimisation satellite access techniques based on:
- satellite link optimisation in terms of traffic layer 2 encapsulation (e.g. adaptation of ULE to DVB-S2 transport using Generic Streams) and usage of new transport protocols to enhance IP over Satellite transmission
- radio resources management techniques (e.g. impact of ACM and Fade Mitigation Techniques on DAMA protocols and algorithms)
- satellite control layer optimisation in terms of QoS, multicast and security aspects

5.9 B2I (B2I), France

The major interest of B2i, in SatSix project, concerning future use of technologies experimented in the project is to get some experience and skills in IPV6 over satellite links in order to develop and sell IPV6 value added services:

- for satellite operators (and maybe terrestrial operators too),
- for end users.

To be able to sell this kind of products, SatSix project is also a great way to be known and recognized, in the future, as an actor of the IPV6 world.

5.10 System (STK), United Kingdom

System has developed, over a number of years, an expertise in research into satellite-orientated telecommunications, with a focus on standardisation. IP-over-satellite is a continuing topic of research and also of standardisation that is essential to identify and consolidate efficient and effective use of this technology.

System will therefore employ the results of SatSix to build on its intellectual investment in technical know-how. Since the timescales of standardisation are often longer and unsynchronised to research projects of limited duration, System will not only use this experience and the results of SatSix to introduce contributions into standardisation during the project, but will also continue this work after the end of the project.

5.11 Hispasat SA (HSA), Spain

HISPASAT is the Spanish satellite operator that operates and provides services to both sides of the Atlantic. HISPASAT has led an extensive research activity in the last 12 years, with several successful projects and results that have reinforced the innovative services offered to final customers and the society in general.

In this line, the active participation of HISPASAT in this project is of strategic importance particularly in terms of usability of project results. SATSIX will bring the opportunity to define future satellite systems in the most advanced areas of research: IPv6, DVB-S2, evolution of DVB-RCS, and the combination of transparent and regenerative payloads. Consequently, HISPASAT will most benefit from the project outcomes in order to enrich its strategic future evolution of services and the enhancement of already commercial applications:

- Addition of new services including IPv6 to most advanced users and customers willing to take advantage of the new functionalities provided by IPv6.
- Definition of near future satellite systems for broadband applications including DVB-S2, DVB-RCS in order to further boost the adoption of DVB-RCS in the building up of the information society.
- Definition of future satellite systems and regenerative payloads based on DVB-S2, DVB-RCS, in order to prepare next generation satellites.

Finally, HISPASAT is a very active member in several standardisation bodies, contributor to several conferences and workshops as a normal way of disseminating its research activity. Consequently, project results will be conveniently canalised through these forums.

5.12 University of Valladolid (UVA), Spain

UVa will use the expertise and knowledge gained from the Satsix project to improve its background of research which will be disseminated through contributions to technical conferences, local presentations at the University and relevant publications (IEEE, etc.).

The results of the project will be used:

- Extending knowledge in the field of IPv6 and QoS in satellite environment.
- To demonstrate the feasibility of innovative application and services over satellite.
- As educational institution, acquired knowledge can be used in the learning activities for preparing better engineers in QoS and satellite aspects.
- To establish the basis for the execution of future projects and collaborations with other project's partners.

5.13 Hungaro DigiTel Plc (HDT), Hungary

Hungaro DigiTel Plc is the largest regional VSAT network operator and service provider. After more than 10 years of operation aimed for the B2B market HDT was the first to implement broadband satellite service using the European standard DVB-RCS. This service is aiming towards the elimination of the digital divide in the region reflected by the internet penetration as visible in the chart No.1. The reason of the low internet penetration is largely (though at different levels) due to the lack of the last mile access of broadband. The high correlation factor of the geographical disadvantages to the economical situation (low income population) indicates the need for a high efficiency and easily realizable solution.

Government supported projects in the region and more particularly in Hungary prove the feasibility of the satellite broadband Internet access nevertheless the efficiency has to be improved. This means that the relatively expensive satellite access to the internet service shall be shared by multiple end users. Theoretically the CATV or other LAN solutions may be applied but the most progressive solution tends to be the wireless access (Wimax envisaged, WiFi until it gets widespread).

The access being solved the usage of Internet services shall be more efficient, therefore the parallel efforts for providing IPv6 features is of essence.

Hungaro DigiTel's major business target being related to the above initiatives HDT foresees an important impact to its success in case the combined VSAT-Wimax-IPv6/ technology gets approved

and available at commercial level. Therefore HDT is convinced that – using its technological and market know-how it can contribute to the success of the EU-supported activity of bridging the digital gap and at the same time – as a pioneer of the new solution – realize business success as well.

5.14 Telespazio (TPZ), Italy

As one of the main world-wide players in the satellite services, Telespazio is particularly interested in the success of the SATSIX Programme, with the goal to design, develop and manage telecommunication networks able to ensure global coverage.

SATSIX shall help Telespazio on the major following items:

- Develop the applications for broadband two-way multimedia telecommunications
- Develop and manage systems for the distribution of television signals for broadcasters via satellite
- Support the distribution of Real Time Services over IP via satellite networks
- Extend the knowledge in the analysis, experimentation and prototyping of terrestrial wireless technologies, in view of the desired extension of its market objectives
- Extend the knowledge in the field of IPv6 and QoS in satellite environment.

6 CONCLUSIONS